

REMARKS

Examiner Edward H. Tso is thanked for the thorough examination and search of the subject Patent Application.

Since the former title of the invention

"Protection Switch with Reverse Voltage Protection"

was estimated as not descriptive, it has been replaced with the new title

"Integrated Circuit Implementing Protection Switch for Battery Charging and Discharging with Enhanced Reverse Voltage Protection"

which is considered being clearly indicative of the invention to which the claims are directed.

According to the results of the examination the first paragraph of page 17 has been amended for clarity only, no new matter has been added.

Claims 1-8, and 10 have been amended.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of the objection of Claim 1 because of its faulty found informalities is requested based on amended Claim 1 and on the following remarks:

As cited by the examiner the phrase "all this implemented... and which in turn itself is controlled" is confusing since it is not cleared what is included or excluded from the control block.

In Claim 1 the last paragraph has been amended to clarify the structure and operation of the current invention by adding and changing the wording as follows:

" and where the flow of energy ~~all this implemented~~ is controlled by means of integrated controllable switches contained within an integrated switching circuit block - establishing said secure connection – and said integrated switching circuit block ~~which in turn itself is~~ being controlled by an integrated controller circuit block sensing and monitoring both said stored electrical energy and said consumed or supplied electrical energy and generating and delivering control signals for said integrated switching circuit block."

Additionally in Claim 1 line 6 the words "manufactured as integrated circuit" have been added to state more precisely the objectives of the current invention. To the same purpose the adjective "integrated" has been added at multiple places wherever appropriate in Claims 1-8.

"1. (currently amended): A circuit for storing electrical energy, and consuming or supplying this energy with intrinsic protection features, comprising:
a means for the storage of electrical energy;
a means for, on the one hand, the consumption of electrical energy or
a means for, on the other hand, the supply of electrical energy; and
a means manufactured as integrated circuit for the secure connection of
said energy storage means with said energy consumption or supply means,
whereby a switchable and controllable flow of energy between said energy storage
means and said energy consumption or supply means is made possible in
conjunction with protection against damaging or destructive operational conditions
during said connection with said energy flowing, and where the flow of energy ~~all~~
~~this implemented~~ is controlled by means of integrated controllable switches
contained within an integrated switching circuit block - establishing said secure
connection - and said integrated switching circuit block ~~which in turn itself is~~ being
controlled by an integrated controller circuit block sensing and monitoring both said
stored electrical energy and said consumed or supplied electrical energy and
generating and delivering control signals for said integrated switching circuit
block."

Furthermored in Claim 10 line 2 the words "manufactured as integrated circuit (IC)" have been added, and later on in line 4 the wording "integrated circuit" has been replaced by the notion "IC".

"10. (currently amended): The circuit according to claim 1 wherein said means manufactured as integrated circuit (IC) for the secure connection of said energy storage means with said energy consumption or supply means is implemented as a monolithic ~~integrated circuit (IC)~~ device."

Reconsideration of the rejection of Claims 1-5 and 9-12 under 35 U.S.C.102(a), as being Applicant's own admitted art to Fig. 1 is requested based on amended Claims 1-8, and 10 and on the following remarks:

As cited by the examiner Figure 1 shows a means for consuming 20 or charging 25 a battery, means for securing connection and protecting against damage 41, 42 and being controlled by a controller block 50. The switches 41, 42 are serially connected FETs with a separate bulk connection (arrows pointing toward 31, 32) and a mid-node N1. Of course, these FETs are formed into an integrated circuit with well-known CMOS-type technology.

The explanation for Fig.1 as given in the description of the claimed invention on page 2 states hereto:

"Realizations of the prior art for such circuits are often implemented as specifically assembled semiconductor circuit systems, consisting of integrated control circuits combined with separate external switching devices considering the specific voltage and current requirements. Fig. **1 prior art** is a commonly used configuration and shown here as an exemplary prior art and showcase battery protection circuit mainly for explanatory purposes. A rechargeable battery 10 is configured such that it can source energy to a load 20 or can be recharged by a charger source 25, both connected to the terminals LOAD/CHARGE 80 and GND 60. Two MOSFET switches N1 31 and N2 32 are used to control the flow of current into (then charging) and out of (then discharging) the battery. The control circuit 50 controls the ON and OFF state of the switches 31 and 32. Typically, the switches comprise discrete devices. Each switch 31 and 32 contains a parasitic bulk-to-drain diode D1 41 and D2 42. By coupling each switch in an opposite manner, each of the parasitic diodes 41 and 42 conducts current in a different direction."

Applicant respectfully disagrees that Fig.1 shows a circuit which uses two integrated switches 41, 42 which are serially connected FETs with a separate bulk connection (arrows pointing toward 31, 32) and a mid-node N1.

Fig. 1 actually shows two discrete devices as explained in the description (see above). Each switch 31 and 32 contains a parasitic bulk-to-drain diode D1 (41) and D2 (42). By coupling each switch in an opposite manner, each of the parasitic diodes 41 and 42 conducts current in a different direction. That means, because of its discrete nature of the FET components N1 (31) and N2 (32) the parasitic diodes D1 and D2 of the FET devices playing an important role a fixed configuration coupling each switch in an opposite manner is chosen, each of the parasitic diodes 41 and 42 conducting current in a different direction.

In comparison, the invention of the Applicant uses a solution with integrated FET components and an integrated switching circuit block as switchable protection circuit, thus incorporating the influence of parasitic diodes by avoiding said fixed configuration, claiming

"A circuit for storing electrical energy, and consuming or supplying this energy with intrinsic protection features, comprising:
a means for the storage of electrical energy;
a means for, on the one hand, the consumption of electrical energy or
a means for, on the other hand, the supply of electrical energy; and
a means manufactured as integrated circuit for secure connection of said energy storage means with said energy consumption or supply means, whereby a switchable and controllable flow of energy between said energy storage means and said energy consumption or supply means is made possible in conjunction with protection against damaging or destructive operational conditions during said connection with said energy flowing, all this implemented by means of integrated controllable switches within an integrated switching circuit block - establishing said secure connection – and which in turn itself is controlled by an integrated controller

circuit block monitoring both said stored electrical energy and said consumed or supplied electrical energy."

Reconsideration of the rejection of Claims 1-5 and 9-12 under 35 U.S.C.102(b), as being anticipated by Hasegawa et al. (US 5,789,900) is requested based on amended Claims 1-8, and 10 and on the following remarks:

As cited by the examiner, the reference discloses a device for protecting a battery from overcharge and overdischarge having, *inter alia*, a means for secured connecting and protecting the battery from damage through a controller 210. The means is implemented from switches made of two FETs 222, 232 having a mid-node S. See figure 1.

Applicant respectfully disagrees that Hasegawa et al. show a device for protecting a battery from overcharge and overdischarge being made up only of switches made of two FETs 222, 232 having a mid node S. Hasegawa et al. actually show in figure 1 of patent US 5,789,900 that two discrete FETs 220, 230 together with their parasitic diodes 222, 232 and two separate diodes 240, 250 are used in a parallel connection to the FETs. In comparison, Applicant does not use separate diodes in parallel connection to the FETs. Additionally all the remarks from above respectively hold true here.

Said cited patent by Hasegawa et al. (US 5,789,900) has also been considered in the related patent application assigned to the same assignee as the present invention, A. Stellberger, with its title "Power Switch for Battery Protection" (US 6,670,790).

Reconsideration of the objection of Claims 6-8 as being dependent upon a rejected base claim is requested based on amended Claims 1-8, and 10 and on the following remarks:

As cited by the examiner, Claims 6-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The premises as cited above cease to apply.

Applicants have reviewed the prior art made of record and not relied upon and have discussed their impact on the present invention above.

Allowance of all Claims is requested.

It is requested that should the Examiner not find that the Claims are now Allowable that the Examiner call the undersigned at 845-452-5863 to overcome any problems preventing allowance.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'SBA', with a stylized flourish at the end.

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